PTERIDOPHYTA NOVAE CALEDONIAE

AND

NEW PTERIDOPHYTES OF SUMATRA

BY

EDWIN BINGHAM COPELAND

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INTRODUCTION

The herbarium of Mr. E. Bonati was purchased in 1927 from his heirs by the California Botanic Garden of Los Angeles. In it were two extensive collections of ferns, one Chinese and the other the New Caledonia ferns collected by Mr. Franc. Besides these large collections, there were of course ferns from other parts of the world and some particularly valuable early collections of New Caledonia ferns received by Bonati from the Paris Museum. The Franc ferns were determined at first and chiefly by Christ, and almost all labels printed to show who determined them bear Christ as the authority. A few of the later ones show determinations by Rosenstock. There are also a few sheets which seem to evidence determination by Christensen and by Brause. There were a considerable number of undetermined ferns in the herbarium, some with and some without data as to place and date of collection.

The Bonati herbarium as received was in indescribable confusion. This doubtless resulted in part, and naturally, from the death of the owner in the midst of his activities, but in large part too, must have characterized it at all times. While the labels show Christ as authority for the determinations of a large part of the sheets, it is impossible to believe otherwise than that in very many instances Christ had determined one specimen and that the name had subsequently been given to other specimens thought to resemble the one Christ actually saw. Besides the presence of labels citing Christ's authority, applied to related or similar plants, there are a number of instances in which a name ascribed to Christ is given to a totally different fern, sometimes to the whole collection of many specimens of a dissimilar fern in a different genus. The confusion is augmented by the use of the same number for collections, at various dates, of ferns supposed to be the same but in many instances different. It is probably the case that a large majority of the numbers apply each to a series of inde-

pendent field collections. Difficulty with the reference to these ferns by their numbers is still further increased by the presence of more than one series, as Nos. 10, 10*b*, 10*c*, 10 bis, etc. There have also been distributed by Rosenstock a series of Franc's New Caledonia ferns under a wholly different series of numbers, as Filices Novae Caledoniae. These ferns were in some cases collected in very large quantities, more than 120 specimens of a single collection being still present in the Bonati herbarium. Bonati evidently disposed of these ferns by individual exchange and in some cases in bulk. The result is that they are very common in herbaria, and have been passed about with second-hand, and sometimes fantastically distorted labels. The point in describing this wholesale confusion among the Franc ferns is to call emphatically to the attention of every one who has them the fact that the numbers and names are exceedingly untrustworthy. These conditions must not be lost sight of by those who undertake to identify ferns of the Franc collection by the citations of numbers in the notes and descriptions which follow.

New species of these ferns have been described by Christ, Rosenstock, Brause, and Hieronymus. The Bonati herbarium contains no specimen bearing the number ascribed to some of these species in their publication.

DESCRIPTION OF SPECIES

Marattia attenuata Lab.

Franc, Nos. "142 bis, determined by Christ," 632, and 142, in part are typical, following de Vriese's monograph and Fournier's notes, both authors having seen Labillardiere's specimens. Fournier lists further *Marattia pellucida* Presl, *M. Smithii* Mett., and *M. ternatea* de Vriese. None of these is in our collections, but there are present two others, apparently distinguishable from *M. attenuata*. No. 653 has very large, almost marginal synangia, and pinnules more gradually narrowed below the apex; specimens bearing this number are from different places and collected six years apart, but are one species. The likelihood that more than one species is referred to *M. attenuata* is observed by both de Vriese and Fournier.

Marattia mertensiana

(Presl, Epim. pl. 1) C. Chr. (?)

Franc, No. 749. This is a very remarkable plant, a number of the distal pinnules of each pinna being simple, and up to 20 cm. long, all the lower ones being again pinnate, their rachises winged almost

throughout, with numerous secondary pinnules about 5 cm. long. While most unlike *M. mertensiana* in appearance, it agrees too well in all characters except dissection and the related size of the leaflets, to invite description before there is more evidence that these are constant.

The Bonati herbarium contains no specimen of Franc, No. 1441, the type number of *Marattia Rolandi Principis* Ros., nor any *Marattia* from the locality cited.

Trichomanes Francii Christ

Bull. Herb. Boiss., ser. 2, vol. 7, p. 648, 1907

Trichomanes cuneatum Christ, *ibid.*, p. 649.

The second of Christ's species was supposed to be distinguished from the first by being larger, more deeply cut, and more delicate in texture. They merge completely in our material and constitute one very distinct species of doubtful affinity with any other species of *Gonocormus*. It is represented in the Bonati herbarium by Franc, No. 163, a cotype, the original specimens of this number, on which the description was based, having been collected in 1906; also by specimens collected in 1910 and distributed with the same number, and by an unnumbered collection from the same place, dated 1907. Contrary to Christ's statement, the fronds may turn brown, in age or in drying. Nos. 828 and 2004, both without date or locality, are sterile, and differ from 163 in being more conspicuously costate, and with long, sparse, somewhat deciduous hairs on the stipe and on the margin of the lower part of the frond.

Trichomanes flavo-fuscum v. d. Bosch

Franc, No. 332, also probably No. 344, received as *Trichomanes elongatum* Cunn. *T. flavo-fuscum* was reduced to *Trichomanes caudatum* by Carruthers and Christensen. Our material, which seems to be correctly named, differs from the plant of Brackenridge in having broader, shorter fronds, the pinnae not caudate, the texture firmer, the margin specialized, the involucre short, and the mouth not greatly enlarged.

Hymenophyllum dimidiatum Mett.

Franc, Nos. 1450, 1392. The protrusion of the receptacle is used as a distinctive character of this species by Fournier, and is not found in our specimens. Otherwise, No. 1450 is typical. No. 1392 has remarkably elongate fronds, segments and valves of the involucre, and might be regarded as distinct and new.

Hymenophyllum Deplanchei Mett.

No. 68 bis, collected in December 1905, and an unnumbered collection of November 1908 are typical and from the type locality, the summit of Mount Mou. No. 1394, from Mount Koghi, is different only in size, the fronds reaching a length of 20 cm.

Cyathea decurrens (Hooker) Copel. comb. nov.

Alsophila decurrens Hooker, Spec. Fil. I, p. 51, 1844.

Alsophila alata Fournier, Ann. Sci. Nat., ser. 5, vol. 18, p. 349, 1873.

This species is not represented in Franc's collection, but the Bonati herbarium contains two sheets, ex Herb. Mus. Paris, one of which, with secondary pinnules about 12 mm. long, not quite contiguous, is labeled Balansa, 1589*b*, *Alsophila decurrens* Mett. The other, Balansa, 1589, with secondary pinnules up to 20 cm. long and imbricate near the axis of the pinna, is a cotype of *A. alata* Fourn. These data are as published by Fournier, except that he omits dimensions; and the determinations are presumably his. The two specimens seem to me to represent one species; if one and only one is *C. decurrens,* I would apply that name to the one given a new name by Fournier.

Cyathea Novae-Caledoniae (Mett.) Copel. comb. nov.

Alsophila Novae-Caledoniae Mett., Ann. Sci. Nat., ser. 4, vol. 15, p. 82, 1861.

Fourniera lepidotricha Fourn., Ann. Sci. Nat., ser. 5, vol. 18, p. 349, 1873.

Represented by Franc, Nos. 712, determined as *A. "neocaledonica"* and as *Cyathea Bonatii* Christ ined.; 553, collected in 1906 and 1907, as *F. lepidotricha;* 669, as *F. lepidotricha;* and 553 collected January 11, 1911, as *Alsophila Francii* Ros. Also in hand are two of the Balansa collections cited by Fournier, 1592*a*, and the unnumbered one from Pont de France above the model farm. The latter consists of two pinnae, one of which is typical *C. Novae-Caledoniae,* while the other should be *F. lepidotricha,* judging by Fournier's key and description. As to *Alsophila Francii,* our specimens of the type number and date are surely *C. Novae-Caledoniae;* but they do not fit Rosenstock's description, and there has been so much confusion in the Bonati herbarium that Rosenstock may well have received a plant no longer present in it. Still under the same number (553) are specimens of *Cyathea intermedia,* collected in November 1906.

Cyathea intermedia (Mett.) Copel. comb. nov.

Alsophila intermedia Mett. Ann. Sci. Nat., ser. 4, vol. 15, p. 83, 1861.

Franc, Nos. 469 in part (labeled *C. Vieillardii*); 553 in part, and 883 (labeled *Fourniera lepidotricha*). There are also in the Bonati herbarium two sheets of Balansa's collection, which differ from Franc's in having the rachises almost smooth; Mettenius described them as "infra nodulosa."

Dryopteris Francii Copel. sp. nov.

Caudice erecto, gracile, basibus appressis stipitum circumdato, pubescente nec paleaceo; stipite usque ad pinnas infimas remotas ad auriculas reductas ca. 10 cm., ad infimas normales ca. 25 cm. alto, gracile, fusco, pubescente; fronde, absque pinnis basalibus minutis, ca. 45 cm. alta, 25 cm. lata, bipinnatifida, in prima vernatione paleis lanceolatis laete castaneis sparse pubescentibus vestita, mox omnino epaleata, rhachi costisque costulisque et sparsissime superne venulis pubescentibus vel setulosis, lamina membranacea glabra; pinnis multis, fere recte patentibus, acuminatis, sessilibus, basi subobliquis paullo dilatatis, 15–18 mm. latis, inferioribus paucis rhachin versus angustatis, ad alam 2 mm. latam costae pinnatifidis; segmentis linearioblongis, ca. 3 mm. latis, obtusis, integris vel apud apices inter apices venularum erosis; venulis ca. 6-paribus, omnibus saepe soriferis, infimis solummodo ad sinus conniventibus et ibidem aut proximis aut anastomosantibus; soris medialibus, parvis, indusio orbiculari-reniforme, castaneo, pilis brevibus paucis albidis ornato.

New Caledonia. Franc, No. 1437.

A well marked species in various respects, particularly by the total absence of paleae except on the very young frond buds.

Dryopteris recedens (J. Smith) O.K.

Franc, No. 139, distributed as *Aspidium subsericeum* Mett., is essentially indistinguishable from Thwaites, Ceylon Plants, No. 1374, which seems to be the basis of the identification of a New Caledonia plant as this species by Mettenius. The type of the species is Cuming, No. 96 (see Species Filicum IV, 136), from the Philippines, of which I have no specimen, nor have I seen this plant from the Philippines. Pancher, No. 483, and Balansa, No. 273, the latter identified as this species by Fournier, match Ceylon specimens still better. *Aspidium subsericeum* Mett. is altogether distinct in pubescence; it is represented by Franc, No. 1475.

Tectaria Milnei (Hooker) Copel. comb. nov.

Polypodium Milnei Hooker, Sp. Fil. IV, p. 254, 1862.

Franc, No. 137, distributed as *Aspidium Kanakorum* Fourn.; Pancher, No. 491. This specific name, the oldest the species has, is valid in *Tectaria*. Mettenius substituted *Aspidium recedens*, perhaps anticipating the transfer to *Aspidium* of *Nephrodium Milnei* Hooker. The species is a relative of *Tectaria malayensis*, from which it differs in the far less complete anastomosis of the veinlets, which may be wholly free in distal parts of the frond. In this respect, it approaches *Dryopteris dissecta*, to which it appears to be really nearly related.

Tectaria Seemannii (Fournier) Copel. comb. nov.

Bathmium Seemannii Fournier, Ann. Sci. Nat., ser. 5, vol. 18, p. 301, 1873.

Franc, No. 370, is probably a small form of this. The indusia distinguish it clearly from *T. latifolia*. The type should be Vieillard, No. 1568, from New Caledonia, but the name refers to Seemann, No. 747, from Fiji. The species is not represented in our Fiji collections. It is related to *T. cesatiana*, a somewhat dimorphous New Guinea fern.

Tectaria tripinnata (Rosenst.) Copel. sp. nov.

Aspidium latifolium (Forst.) var. *tripinnata* Rosenst., Fedde's Report, vol. 9, p. 162, 1910.

Rhizomate ignoto; stipite 25 cm. alto, ad basin paleis nigris linearilanceolatis 1 cm. longis ornato, alibi rhachique glaberrimis purpureocastaneis nitidis, pedicellis pinnularum costisque minute pubescentibus, lamina glabra; fronde 45 cm. longa, late deltoidea, tripinnata, apice pinnatifida; pinnis infimis longe (3 cm.) pedicellatis, 25 cm. longis, deltoideis, pinnulis earum utroque latere ca. 4, inferioribus etiam longe pedicellatis, supremis adnatis, infimis 12 cm. longis solummodo pinnatis, sequentibus pinnatifidis, ovatis, cordatis, acutis, membranaceis, lobis oblongis, obtusis, 5–8 mm. latis, crenato-sinuatis vel infimis basiscopice dilatatis et ibidem leviter lobatis; venulis more Sageniae anastomosantibus cum liberis inclusis hamatis; soris parvis, orbicularibus, adspersis, indusio hic vestigiale illuc nullo.

Loyalty Is., Badini, in forests. Franc, No. 1030. January 1908.

Distributed as *Aspidium latifolium*, from which it differs greatly in appearance because of the greater dissection, the lanceolate segments of that species being replaced by stalked, cordate, ovate pinnules. On some sori, a minute, central indusium can be detected positively by sufficient magnification, while on others, with the sporangia

still immature, no trace of it is visible. I named and described this fern before noting that Rosenstock had already described it and *given it the same name.*

Cionidium Moorei (Hooker) Moore

Franc, No. 715, distributed as *Deparia Moorei.* The only objection to calling this peculiar indigenous fern an *Aspidium* or *Tectaria* is one of convenience in generic definition and recognition. Since it has a distinctive and valid generic name, I prefer to use it. Of course it cannot properly be called *Deparia,* the type of which is an *Athyrium,* at least in affinity; nor should *Tectaria Godeffroyi* be joined with it in *Cionidium,* though the affinity is in this case much nearer.

Athyrium congruum (Brack.) Copel. comb. nov.

Diplazium congruum Brack. U. S. Expl. Exped., vol. 19, p. 151, pl. 18, fig. 2, 1854.

Franc, No. 1452, is probably this species, described from Samoa and Fiji. The specimens are atypical in having broader fronds, with the lowest pinnae somewhat deflexed, the segments more broadly rounded, and the margin more toothed. To the same species, I refer more confidently a Norfolk Island specimen collected in 1902 by Isaac Robinson, and distributed by the herbarium of the Botanic Gardens, Sydney as *Diplazium japonicum* (Thunb.) Bedd. Franc, No. 747, deviates from typical *A. congruum* in an opposite direction, being more slender throughout, but has also a toothed margin. It is densely soriferous, while No. 1452 is sparsely so; they look like distinct species, but the difference may be correlated wholly with the fructification. Including all of these and its typical form, this species is still more uniform than are its near relatives, *Athyrium japonicum* and *Athyrium grammitoides. A. japonicum* has been reported from Kaiserwilhelmsland.

Athyrium sororium (Mett.) Copel. comb. nov.

Asplenium sororium Mett., Ann. Sci. Nat., ser. 4, vol. 15, p. 73, 1861.
Diplazii maximi varietas, C. Chr., Index, 225.

Franc, No. 34 (as our specimens are numbered), is this species, agreeing with Mettenius' diagnosis in every visible detail (we have no stipe) except that it grows larger and its indusium is not ciliate; it is somewhat fimbriate, but even this might not be so in young stages. *Athyrium maximum* is better represented in the same herbarium by

Nos. 34 bis, 333, and 1463 (two of which were distributed as *Diplazium sororium*). From these, *A. sororium* differs in its much thinner lamina, finely but sparsely paleaceous costae, slenderly stalked lower pinnules with broadly subcordate instead of subtruncate bases, deeper lobing with the lobes rounded instead of obliquely truncate, and lowest veins running to or often past the sinuses instead of usually ending below them. Its rachis is probably never spinulose.

Athyrium Wattsii Copel. sp. nov.

Stipite ca. 3 mm. crasso, fusco-fulvo, in sulca ventrale crinito alibi grabrescente; fronde plusquam 50 cm. alta, late ovata, glabra, laete viride, membranacea, bipinnata, apice pinnatifida; pinna infima quam sequentibus minore et rhachin versus angustata; pinnis suprabasalibus usque ad 30 cm. longis et 13 cm. latis, brevipedicellatis, acuminatis; pinnulis majoribus 7 cm. longis, 17 mm. latis, brevipedicellatis pedicellis alatis, basi truncatis, apice serratis caudatis, deorsum ultra mediam laminam pinnatifidis, lobis ca. 5 mm. latis, apice rotundatis serrulatis; venis simplicibus, paucis (usque ad 6-paribus), infimis supra sinus terminantibus; soris costularibus marginem vix attingentibus; indusiis angustis, tenuibus, ferrugineis; pinnis infraapicalibus alternantibus utroque latere, ca. 6 pinnatifidis, segmentis ovato-lanceolatis late acutis.

New Britain, Herbertshöhe, 1. Lt. Goadby, March 1915. Received from the Rev. W. W. Watts, in appreciation of whom it is named. It appears to have been determined at the National Herbarium of New South Wales as "*Diplazium latifolium* Don (= D. maximum Don)." It is a near relative of *A. sororium*, and described here for that reason. It differs from that species in being more deeply bipinnatifid, and glabrous, with the larger pinnules squarely truncate but not cordate, and their pedicels winged. The smaller pinnules of both species are adnate. The material in hand consists of a fruiting frond 50 cm. long and part of the rachis, a smaller and simpler sterile frond, and parts of a larger frond; the diagnosis is based largely on the last.

Athyrium Rosenstockii Copel. sp. nov.

Caudice erecto, breve, vero 1–2 cm. crasso sed cum basibus stipitum et radicibus multis fere 2 mm. crassis truncum duplo validiorem simulante, apice frondibus involutis paleis papyraceis nigris ovato-lanceolatis usque ad 1 cm. longis vestitis protecto; stipite erecto, alto, 6 mm. crasso, angulare, nigro, basin versus sparse nigro-paleaceo, sursum glabro; fronde maxima, ovata, acuminata, tenuiter papyracea, glabra, nigrescente, tripinnata, axibus nigris; pinnis usque ad 45 cm. longis et 14 cm. latis, brevipedicellatis, acuminatis; pinnulis[1] vix contiguis, pedicellatis, 8 cm. longis, 2 cm. latis, apice serratis acuminatis;

pinnulis[ii] infimis brevipedicellatis, plerisque adnatis, 4–5 mm. latis, basi obliquis, apice late rotundatis, infimis ½ ad costam pinnatisectis lobis integris; venis pauci-ramosis; soro a costa plerumque in plena fructificatione ultra mediam laminam protenso; indusio nigro vel brunneo, angusto.

Loyalty Island. Franc, No. 1078. January 1908.

This bears Rosenstock's notation as a new species, but has not been described by him and may well bear his name. It is not very near to any other species known to me. The herbarium contains an entire frond 45 cm. long, on a stipe 30 cm. long, sparsely fruiting, with short costal sori. The diagnosis is based largely on parts of a very much larger plant, the full dimensions of which are not clearly indicated; but it was very large.

Blechnum chauliodontum Copel. sp. nov.

Lomaria, rhizomate ut videtur horizontale, 8 mm. crasso; stipitibus dense confertis, basibus paleis nigris castaneo-marginatis linearibus acicularibus 1 cm. longis vestitis, sursum glabrescentibus fusco-stramineis, frondium sterilium 25 cm., fertilium 30–40 cm. altis, gracilibus; fronde sterile pinnata cum foliola simile apicale, basi haud angustata, usque ad 25 cm. longa, late ovata; pinnis utroque latere usque ad 6, brevipedicellatis, lineari-ellipticis, 12–15 mm. latis, basi late rotundatis, inferioribus obtusis vel acutis, supremis abrupte acuminatis, papyraceis, insigniter argute serrulatis dentibus 1 mm. longis angustis falcatis, praecipue inferne fusco-vinoso-olivaceis, costa inferne paleis tenuibus brunneis inconspicuis praedita, lamina glabra; venis inconspicuis, plerisque simplicibus, in sinus dentium currentibus; fronde fertile paullo majore, pinnis ca. 4 mm. latis, steriliter caudatis, indusio lato, membranaceo, deinde crenulato-lacerato.

New Caledonia, in dark woods, alt. 200–300 m. Franc, No. 915. January 1907.

Received as *Lomaria procera,* from which it differs essentially in the dark, narrow paleae. The teeth are like those of *B. Moorei* C. Chr. in projecting between, not from, the tips of the veins, but are less extremely narrow.

Blechnum castaneum Copel. sp. nov.

Lomaria, caudice erecto elongato, vero vix 1 cm. crasso sed cum paleis, radicibus, et basibus stipitum frondium emortuarum truncum 4 cm. crassum praestante, paleis castaneis vel atrocastaneis acicularibus 1–2 cm. longis densissime vestito; stipitibus adscendentibus, ca. 15 cm. longis, fusco-castaneis, glabrescentibus; fronde sterile 1 m. alta, medio 25 cm. lata, utrinque angustata, pinnata, papyracea, superne viride glabra, inferne fusca vel badia pilis sparsis et caducis

subpubescente deinde glabra; pinnis permultis, adnatis, infimis ad auriculas deltoideas reductis non remotis sed ob staturam parvam separatis, medialibus late patentibus, linearibus, 8 mm. latis, medio longitudine vix latetudine ipsarum separatis, acuminatis, integris vel apices versus obscure crenulatis, rhachin versus dilatatis vix confluentibus, costa conspicua superne sulcata inferne prominente, venis geminatis vel furcatis inferne pallidis et conspicuis; fronde fertile minore, ca. 45 cm. alta, 10–15 cm. lata, rhachi sparse furfuracea, pinnis horizontalibus, adnatis, 2–3 mm. latis, indusio firmo, integro.

New Caledonia, Mount Dzumao, alt. 800 m. Franc, No. 350. December 1906.

This plant appears in the Bonati herbarium as *Lomaria vulcanica* Bl. "Déterm. par. Dr. Christ," and it just happens to key out perfectly to that name with Fournier's key (Ann. Sc. Nat. ser. 5, vol. 18, p. 313, 1873). It has neither resemblance nor near affinity to that species; and as Christ had correctly interpreted *Blechnum vulcanicum* for me not long before this New Caledonia collection was named, it is hardly believable that he was responsible for the error here. I have not seen *B. vulcanicum* from New Caledonia, but do not doubt that it occurs there. *B. castaneum* is a relative of *B. discolor,* which has broader fertile pinnae with dilated bases, lacerate indusia, and usually blackish axes. *B. attenuatum* has a prostrate rhizome, and paler paleae. *B. Deplanchei* is smaller, with blunt pinnae. Both *B. norfolkianum* and *B. contiguum,* which may be indistinguishable, are smaller ferns, with relatively broad sterile pinnae, and the reduced basal ones contiguous.

Blechnum Patersoni (R. Br.) Mett.

Franc, No. 368, is clearly this species. No. 651 can also be referred to it; this number has been determined, apparently correctly, as *Blechnum Vieillardii* Mett.

Doodia gracilis Copel, sp. nov.

Rhizomate brevi, repente, paleis castaneis vestito; stipitibus confertis, 1–5 cm. altis, basibus nigris paleis parvis angustis brunneis praeditis, sursum rhachibusque pilosulis stramineis vel badiis; fronde sterile usque ad 15 cm. longa, 1 cm. lata, pinnata, apice obtusa vix angustata minute et argute appresso-denticulata, infra apicem pinnatifida, rhachi filiforme debile; pinnis infimis remotis, stipitulatis, modo diminutis, medialibus sessilibus, rotundato-oblongis, 4–5 mm. longis, 3 mm. latis, argute dentatis, papyraceis, glabris; venis liberis vel rarius paucis more generis anastomosantibus; fronde fertile erecta, 20–30 cm. alta, 10–15 mm. lata, valde caudata; pinnis superioribus

adnatis, infimis plerumque sterilibus, medialibus plerisque hastatis, supra basin ita dilatatam anguste oblongis, venis more generis anastomosantibus, soro et indusio more Blechni linearibus utroque latere costae coadunatis.

New Caledonia, Dumbea, in moist woods. Franc, No. 600. July 1915.

Received as *Doodia caudata,* from typical forms of which it is too different to demand comparison. To that species, however, has been reduced *D. linearis* Moore: J. Smith, which must be very like this in general aspect; its sterile frond is described as "sinuose pinnatifid below, subentire above." If a sterile frond of *D. gracilis* is 12 cm. long, the entire (but toothed) apex may be 15 mm. long, the next 2 cm. below this pinnatifid, and all the remainder of the frond pinnate. Neither the free venation of the sterile pinnae, nor the blechnoid sori, suffices to cast any doubt on the reference of this species to *Doodia.*

Asplenium macrourum Copel. sp. nov.

Rhizomate scandente, 7–10 mm. crasso, paleis nigris ovato-lanceolatis integris 3 mm. longis vestito; stipitibus approximatis, 10–15 cm. altis, deorsum paleis parvis nigris lanceolatis vestito, sursum rhachique subglabris; fronde usque ad 50 cm. longa, 12–18 cm. lata, subbipinnata, apice lineare subpinnata, basi paullo angustata, rhachi apicem solummodo versus decurrenti-alata; pinnis medialibus stipitulatis, usque ad 11 cm. longis, 15 mm. latis, in caudas argute pauciserratas angustissimas 15–35 mm. longas desinentibus, ad laminam 1–2 mm. latam costas sequentem pinnatifidis, herbaceis, viridibus, glabris vel ad costas inferne paleis parvis paucis praeditis; segmentis plerisque cuneatis apice truncatis, dichotome 2–6-dentatis et ibidem 3–4 mm. latis, superioribus lanceolatis integris acutis; soris ad segmenta lata interdum 2, alibi solitariis, plerisque 7–8 mm. longis, apices et baseos segmentorum vix attingentibus; indusiis brunneis, cum margine conterminantibus.

New Caledonia, Ouebendia, alt. 500 m., in wet woods; 1. Franc, No. 654.

In form very like an overgrown *A. Belangeri,* but a relative of *A. scandens* J. Sm., of which the New Guinea form is more broadly winged and less finely dissected than is the typical Philippine form. This specimen is said to have been determined by Christ as *A. nodulosum* Kaulf., and may well be the fern so called by Fournier; but, however it may resemble some forms of *A. lineatum* Sw. in its dissection, I doubt its having any near affinity to that diversified assemblage of Mascarene forms. It is likewise distinct in affinity from the Oceanic group of *A. bulbiferum.*

Asplenium ceratophyllum Copel. sp. nov.

Rhizomate repente, breve, 5 mm. crasso, lignoso, paleis persistentibus atrocastaneis interdum brunneo-marginatis lanceolatis acuminatis integris vestito; stipitibus approximatis, 2–3 cm. longis, paleis parvis brunneis apicibus filiformibus crinitis, sursum glabrescentibus; fronde 4–5 cm. alta, late deltoidea, coriacea, paleis paucis supra basin filiformibus adspersa, glabrescente, in segmenta pauca setiformia bipinnata; pinnis infimis usque ad 25 mm. longis, utroque latere pinnulis 2 vel 3 praeditis quarum infimis plerumque bis furcatis, aliis simplicibus; pinna sequente utroque latere una saepe pinnata vel furcata; pinnis superioribus utroque latere 1–3 simplicibus; segmentis omnibus (aut pinnis aut pinnulis) ca. 0.5 mm. latis, 1–2 cm. longis, subteretis sed superne excavatis; soro ad segmentum quidque uno, lineare, inframediale, plerumque 5–7 mm. longo, indusio marginem superante.

New Caledonia, Mount Koghi; 1. Franc (1908).

This purports to have Christ's determination as *A. viviparum forma nana,* but it is not at all that species. The short, stout, very scaly stem, well supplied with stout roots, gives the impression that it is a member of the peculiar group of *A. bipinnatifidum,* although there are no runners present on the specimen in hand. So far as is shown by the features appearing in his key, this may be the *A. borbonicum* of Fournier.

Stenochlaena Balansae (Fournier) Copel. comb. nov.

Lomariopsis Balansae Fourn., Ann. Sci. Nat., ser. 5, vol. 18, p. 371, 1873.

Franc, No. 663. This species was overlooked by Underwood. Its emphasized diagnostic character was provided by the base of the sterile pinna, "subcordatis vel supra dilatatis."

Dicksonia Deplanchei Vieill. *in* Baker, Syn. Fil. 462

This is described as having "rhachises grey-brown, asperous; fertile segments consisting of 6–10 sori, and tip and midrib; texture rigidly coriaceous; both sides green, glabrous." Franc, No. 603, is named *D. Deplanchei,* as determined by Christ and, in my opinion, correctly. The rhachises are bristly beneath, as well as somewhat asperous. The texture is as described, but the foliage is brownish, especially beneath, as is commonly associated with such texture. The sori are 1 to 8 on a segment, and the lamina is variously reduced, but nowhere to the typical extent, wherein it conforms to the description of *D. Badouini* Fourn. No. 2010, unidentified in the herbarium, like-

wise from Mount Mou, is certainly the same species. Its axes are asperous but no longer bristly; and the well developed fertile segments have 8 or 10 sori each. Their lamina is reduced enough to fit the description, though less extremely than in *D. Brackenridgei* and *D. thyrsopteroidea.* An unnumbered Pancher specimen, received from the Paris Museum as *D. Berteroana* Hook., represents the same species. The New Caledonia plant is indeed very near to *D. berteriana,* but can probably be distinguished by fertile pinnules cut to a broad but not continuously winged costa, and by a somewhat smaller indusium ("inner valve"). My belief is, accordingly, that the report of *D. berteriana* in New Caledonia is due to confusion with *D. Deplanchei.* Beyond this, I suspect that *D. Badouini* is the same species, described from material with imperfectly differentiated fertile pinnae; if so, *D. Deplanchei* is a synonym.

The base of the stipe is deeply immersed in cinnamon brown wool, above which is a zone densely beset with long, purple castaneous bristles. The reduction and disappearance of these bristles on the smaller axes leaves them rough.

Lindsaya minima Copel. sp. nov.

L. microphyllae affinis: rhizomate repente, breve, paleis rufis in vetustate fuscescentibus vestito; frondis sterilis stipite 1–2 cm. alto, gracile, nudo; lamina 2–4 cm. longa, 6–9 mm. lata, pinnata, rhachi sursum alata, pinnis superioribus sessilibus cuneatis, infimis saepius stipitulatis et usque ad basin flabellatim inciso-partitis, glabris, membranaceis, venis liberis; frondis fertilis stipite 6–10 cm. alto, gracillimo; lamina 2–4 cm. longa, ca. 5 mm. lata, pinnis pedicellatis, aut omnibus simplicibus aut infimis dichotomis, pinnis vel segmentis transversaliter lunulatis, 2–3 mm. latis, 1–2 mm. longis, apice late exsculptis, deflexis, venis furcatis in soro confluentibus; soro solitario apicem totam complente, indusio cum margine conterminante.

New Caledonia. Franc, No. 2217.

A most remarkable little fern, which, except for its certain affinity to *L. microphylla,* I might have felt obliged, as a matter of generic definition, to refer to *Sphenomeris.*

Sphenomeris alutacea (Mett) Copel. comb. nov.

Lindsaya alutacea Mett., Ann. Sci. Nat., ser. 4, vol. 15, p. 63, 1861.

Franc, No. 500.

Sphenomeris deltoidea (C. Chr.) Copel. comb. nov.

Lindsaya deltoidea C. Chr., Index, 393, 1906.
Lindsaya elongata Labill., nec Cav.

Franc, No. 59, typical or slightly larger; 358, a very large, quadripinnate plant. Both this and the preceding species are nearly related to *Sphenomeris retusa* (Cav.) Maxon.

Sphenomeris Moorei (Hooker) comb. nov.

Davallia Moorei Hooker, Second Century of Ferns, pl. 53, 1861.
Odontosoria Moorei Kuhn. Chaetopterides—name only.

Franc, No. 360.

Sphenomeris scoparia (Mett.) Copel. comb. nov.

Lindsaya scoparia Mett., Ann. Sci. Nat., ser. 4, vol. 15, p. 64, 1861.
Odontosoria scoparia Diels, Nat. Pflfam. 1[4], p. 215, 1899.

Franc, *s. n.;* also some fronds mixed with No. 360. This and *S. Moorei* are related species, clearly related to *Tapeinidium* and to *Sphenomeris,* as is likewise true of a very different plant recently discovered in Sumatra. I place them in *Sphenomeris* because they more nearly fit its accepted description. If, however, it becomes necessary to combine the genera, as may occur if they prove to be connected by plural evolutionary lines, they will have to be called *Tapeinidium.* There is no such near affinity of either species to *Lindsaya,* and none near at all to *Davallia.*

Pteris Balansae Fourn

Ann. Sci. Nat., ser. 5, vol. 18, p. 320, 1873

Pteris polymorpha Fourn., *ibid.,* nec Poir.
Pteris Fournieri C. Chr., Index, 598.

Franc, No. 368, is thoroughly typical *P. Balansae.* No. 369 is typical and topotypic *P. Fournieri.* They quite certainly represent one species, the name of which is *P. Balansae;* but the description of *P. polymorpha* is of the plant in its more typical development.

Adiantum aethiopicum L.

Franc, *s. n.* and No. 1306. Apparently new to New Caledonia, but reported from Australia.

Adiantum Fournieri Copel. sp. nov.

A. hispidulo affine, rhizomate repente 2–3 mm. crasso, stipite 25–40 cm. alto, atro, nitido, basi paleis angustissimis atrocastaneis 3 mm. longis vestito, sursum rhachique in sulca ventrali pilosis alibi glabris; fronde 15–25 cm. longa, deltoidea, foliola mediale maxima lanceolata pinnata, pinnis infimis aut pinnatis aut ramo basiscopico pinnato praeditis; pinnis sequentibus interdum pinnatis; pinnulis infimis flabelliformibus, aliis dimidiatis, oblongis, obtusis, obscuris, coriaceis, sparse pilosis; indusiis latis, castaneis, omnino nudis.

New Caledonia, Franc, No. 1448. Type: also, Nos. 744, 1466.

This is *Adiantum rigidum* Fournier, at least in part, that name being invalid for it. I have redescribed, instead of merely renaming it, because, so far as a type appears fixable by Fournier's description, it is one collected by Pancher without collector's number, and it is not unlikely that the reduction to *A. hispidulum* is justified by specimens of that species collected by Pancher and labeled *A. rigidum*. *A. Fournieri* differs from *A. hispidulum* in having all axes naked beneath, as are also the indusia; the frond has fewer major divisions than are usual on correspondingly developed fronds of *A. hispidulum*, and the pinnules are larger and more firm, if not more harsh, in texture.

Selliguea heterocarpoides Copel. sp. nov.

Species altera inter S. heterocarpam Bl. et S. Féei Bory, rhizomate repente, 2–3 mm. crasso, glauco, paleis ferrugineis ovatis appressis vestito; stipitibus 3–6 cm. altis, stramineis, gracilibus; frondibus lanceolatis, 10–15 cm. longis, sterilibus 2.5–3 cm., fertilibus ca. 2 cm. latis, haud basin versus dilatatis, basi acutis apice acuminatis, integris margine anguste cartilagineis, coriaceis; venis gracilibus manifestis, venulis immersis; soris subimmersis, oblongis, costalibus, a margine remotis.

New Caledonia, "leg. Franc à Noumea," *s. n.*

This was distributed with Christ's purported determination as *Polypodium Féei*, and is like that species in rhizome characters. In form and texture of frond it is like *S. heterocarpa*, with sori immersed but less marked on the upper surface than is usual in that species. In a recent study of the ferns of Fiji, I have found occasion to describe, as *S. féeioides*, a species which reverses these peculiarities, having the paleae of *S. heterocarpa* and the fronds of *S. Féei*.

Polypodium Mettenii Copel. sp. nov.

Polypodium Brownii Mett., partim.
Pleopeltis longifolia Fourn., excl. syn.

Dictymia, rhizomate late repente, 3–5 mm. crasso, in siccitate corrugato, paleis atrofuscis ovatis ad baseos peltatas mox disruptis vestito; stipitibus 1–2 cm. remotis, 3–5 cm. altis; fronde lineari-loriforme, 30–45 cm. longa, 8–15 mm. lata, utrinque sensim acuminata, anguste cartilagineo-marginata, margine late obscure et oblique undulata, subcoriacea, glabra, costa utraque facie prominente; venis ita anastomosantibus ut series ca. 4 areolarum efficiuntur, venulis inclusis nullis; soris obliquis, usque ad 4 mm. longis et 1.5 mm. latis, immersis, inter se ca. 1 cm. remotis, areolas ultimas fere marginales complentibus, sine paraphysibus.

New Caledonia, Prony. 1. Franc, July 1914, Type; also Pancher, No. 0507, alt. 1000 m.

This is the second form listed by Mettenius, Ann. Sci. Nat., ser. 4, vol. 15, p. 77, 1861), as *P. Brownii* Wikstr., distinguished by "rhizomate validiore, foliis linearibus utrinque longe attenuatis subsinuatis, soris margini valde approximatis." Fournier, Ann. Sci. Nat., ser. 5, vol. 18, p. 285, 1873, construed it as *Pleopeltis* (or *Grammitis*) *longifolia* Bl., which is indeed very similar in appearance but probably no near relative, being a true *Phymatodes,* with free included veinlets in the areolae.

It is customary to construe Presl's genus *Dictyopteris* as synonymous with *Tectaria* (*Aspidium*). The combination of first named species, *D. attenuata,* and of the clear statement that "Dictyopteris affinis est Pleopeltidi," Tentamen, 194, seems to me to fix its type as *Polypodium attenuatum* R. Br., now known as *P. Brownii* Wikstr. The name, however, had been used before Presl, which leaves *Dictymia* J. Smith the valid name for this small group of ferns. Its type remains *Polypodium Brownii,* an Australian fern, ascribed to New Zealand, New Caledonia, the New Hebrides, and Fiji. In Australia, it is a narrowly linear fern, with the sori at least as near to the costa as to the margin, and persistently paleate rhizome. As to New Caledonia, neither of Mettenius' ferns is identical with the Australian. If we construe our species closely, the Fiji plant is a fourth one. And I have seen no New Zealand specimen.

A New Zealand fern once mistaken for Brown's *P. attenuatum,* and ever since mistaken for one of its relatives, is that known of late as *Polypodium Dictyopteris* Mett., Ann. Sci. Nat., ser. 4, vol. 15, p. 77,

1861. In spite of its short sori, it is a perfectly clear-cut *Loxogramme,* and must apparently be called **L. Dictyopteris** (Mett.). This identification involves a considerable extension of the accepted geographical range of *Loxogramme,* and is a reminder that the original collection of *L. scolopendrina* was said to have come from New Zealand. Bory's description and figure leave no chance to suspect that *L. Dictyopteris* was his fern.

Polypodium pseudaustrale Fourn.

Ann. Sci. Nat., ser. 5, vol. 18, p. 282, 1873

Polypodium nanum Vieillard *in* Baker, Syn. Fil., nec Fée.
Polypodium Pumilio Hieron.

Franc, Nos. 876 and 2002, were distributed as *P. Pumilio,* a name substituted by Hieronymus for *P. nanum* Vieillard. They are identical with Balansa, No. 862, the second collection cited by Fournier in the publication of *P. pseudaustrale.*

Tmesipteris "tannensis Bernh."

The collection is rich in this genus, besides undetermined specimens having apparently Christ's determinations of:

No. 468, as *T. Vieillardii* Dang.

No. 541, as *T. elongata* Dang.

No. 338, as *T. lanceolata* Dang.,

and a part of No. 468 labeled *T. Billardieri*—which it is not, if that species be distinguishable. I cannot distinguish between the specimens under Nos. 468 and 541. Nos. 338 and 600 have broader, remote, more regularly alternate leaves, much less oblique at their apices. The Philippine plant called *T. tannensis* is somewhat like these. I have not much sympathy with the idea that, because it is locally variable or because one plant may bear various leaves, all *Tmesipteris* should be regarded as *T. tannensis;* but dissection of a number of stems leaves me very doubtful as to the diagnostic value of Dangeard's criteria.

NEW PTERIDOPHYTES OF SUMATRA

BY

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INTRODUCTION

The species here described as new are found in recent collections by H. H. Bartlett and a native collector, Rahmat, engaged by Professor Bartlett's arrangement.

Besides the species apparently new, Rahmat's collection includes *Trichomanes hispidulum* Mett., a remarkable species hitherto known from the Malay Peninsula and Borneo. A recent collection by H. S. Yates contains *Brainea insignis* Hooker, new to Sumatra, with the note that it is "a characteristic plant of grasslands at high altitudes, never seen except after fire has removed other vegetation." The Philippine occurrence of this fern seems likewise to be confined to scorched grass patches. Yates, No. 2487, is either *Dryopteris Teuscheri* v. A. v. R., hitherto regarded as endemic in Borneo, or a nearly related new species. The types of the new species are in the herbarium of the University of California.

Cyathea Bartlettii Copel. sp. nov.

Rhachi valida, 8 mm. crassa, inferne aspera, fusca, glabrescente, superne pilis fuscis et pallescentibus cum paleis linearibus intermixtis vestita, ad latera etiam paleis lanceolatis laete brunneis 1 cm. longis ornata; pinna 55 cm. longa, 15 cm. lata, stipitata, acuminata, rhachi ubique pilis et paleis diversis dense vestita, paleis ad latera sulcae ventralis maximis, usque ad 4 mm. longis, saepius crinitis, laete brunneis cum marginibus castaneis et setis minutis castaneis ciliatis; pinnulis brevistipitulatis, 8 cm. longis, 15 mm. latis, abrupte acutis et plerisque subfalcatis, basi cordatis vel truncatis, ultra mediam laminam pinnatifidis, herbaceis, superne atroviridibus inferne pallidis, lamina glabra, costa superne appresso-hirsuta, inferne nuda; segmentis 4 mm. latis, oblique rotundato-truncatis, *imbricatis,* fere integris; venulis ca. 6-paribus, plerisque vel omnibus simplicibus; soris medialibus, nudis, mox confluentibus et laminam pinnulae, apice et apicibus segmentorum exceptis, omnino obtegentibus, sporangiis cum pilis longis albis multis intermixtis.

Sumatra, Deleng Singkoet, north of Berastagi, Karo Plateau. Bartlett, No. 6600, U. C. Herb. No. 349285.

Cyathea paraphysata Copel., of Borneo, has the sori similarly full of filiform paraphyses, but is very different in scaliness. *C. Burbidgei,* likewise of Borneo, is more scantily supplied with paraphyses, and is otherwise quite distinct.

Cyathea pulchra Copel. sp. nov.

Plate 55

Stipite gracile, 8 mm. crasso, brunneo, paleis albis nitidis 15 mm. longis 1.5–2 mm. latis valde acuminatis basibus plerumque minute cordatis et appendiculatis, setis minutis castaneis ciliatis, pulcherrime vestito; rhachibus paleis similibus minoribus ornatis, asperis; pinna 35 cm. longa, 10 cm. lata, brevistipitata; pinnulis multis, 5.5 cm. longis, 12 mm. latis, sessilibus, acutis, ⅓ ad costam incisis, herbaceis, inferne pallidis, lamina glabra, costa superne appresso-pilosula, inferne deorsum paleis minutis ciliatis vestita, apicem versus venisque minute et sparse setosis; segmentis majoribus 2.5 mm. longis, 3 mm. latis, subtriangularibus; venulis utroque latere 4 vel 5, simplicibus; soris medialibus, exindusiatis, confluentibus, paraphysibus albis longis filiformibus pilosis.

Sumatra, near triangulation pillar *D,* on Deleng Koltoe (near Kampong Goersinga), Karo Plateau. Bartlett, No. 8552, U. C. Herb. No. 349091.

Related to the preceding species (*C. Bartlettii*), but more scaly, clearly distinguished by the whiteness of the scales, and with less incised, sessile, not at all cordate pinnules.

Cyathea paleata Copel. sp. nov.

Plate 56

Stipite deorsum nigrescente inferne muricato nudo, superne densissime paleis castaneis nitidis 15 mm. longis 2.5 mm. latis acuminatis apices versus contortis primo breviter ciliatis deinde margine leviter erosis vestito, sursum flavo-fusco, minutius aspero, et paleis paullo pallidioribus ornato; rhachi inferne nuda inerme, superne pilis minutis purpureis et albescentibus velutina; pinna 40 cm. longa, ca. 12 cm. lata, subsessile; pinnulis vix contiguis, sessilibus, 6.5 cm. longis, 17 mm. latis, abrupte subacuminatis, profunde pinnatifidis, subcoriaceis, inferne pallidis, costa superne velutina, inferne nuda vel paleis brunneis perpaucis ornata; segmentis pinnularum majorum ca. 13-paribus, 3 mm. latis, obtusis, obscure crenulatis; venulis ca. 10-paribus, plerisque furcatis; soris ferrugineis, subcostularibus, confertis; indusio incompleto, mox evanescente.

Sumatra, slopes and summit of Deleng Baroes, Karoland. Bartlett, No. 8474, U. C. Herb. No. 349092.

Strongly characterized by the extreme scaliness of the upper side of the stipe. In some respects, like *C. javanica* Bl., but with much less scaly costae and less evident indusium.

Dryopteris pinnata Copel. sp. nov.

Caudice erecto, parvo, basibus stipitum et radicibus nigris validis typi Diplazii omnino occulto; stipitibus caespitosis 2–5 cm. altis vel altioribus pallide breviter velutinis; fronde 6–9 cm. longa, ovata, caudato-acuminata, pinnata, herbacea, atro-viride, rhachi costisque et sparsius venis primariis pilis albis obsitis; pinnis veris 5–8 paribus, infimis brevissime pedicellatis abbrevatis deflexis, sequentibus subsessilibus maximis 2–3 cm. longis, 5–7 mm. latis, apice rotundatis, basi acroscopice auriculatis basiscopice plerumque rotundatis interdum truncatis aut enim hic etiam dilatatis, oblique leviter incisis, superioribus adnatis, supra pinnas veras segmentis paucis coadunatis linearioblongis integris; venulis paucis simplicibus; soris inframedialibus; indusio orbiculari-reniforme, sparse pilosa, haud glandulifero.

Sumatra, waterfall of the Asahan River, Si Moenoeng-Moenoeng, near Oedjoeng Batoe, above Bandar Polloe, Asahan. Bartlett, No. 6641, U. C. Herb. No. 349295.

A relative of *D. calcarata* (Bl.) O. K., than which it is less hairy and less dissected, as well as smaller. Some of the specimens bear dead bases of stipes longer than any of those bearing fronds. Judging by description, *D. diversifolia* v. A. v. R., of the Batu islands, must be rather similar, but more deeply cut, with more remote sori and glandular indusia.

Dryopteris inclusa Copel. sp. nov.

Plate 57

Rhizomate repente, fere 1 cm. crasso, fragmentis palearum onusto; fronde, stipite incluso, 120 cm. alta; stipite valido, superne tricarinato, ferrugineo, paleis sparsissimis ovatis ferrugineis ornato, minute pubescente; rhachi straminea vel viride, minute setulosa; fronde pinnata, apice pinnatifida; pinnis inferioribus remotis, paullo diminutis, basi cuneatis; suprabasalibus brevi-pedicellatis latissime cuneatis, supramedialibus potius truncatis sessilibus, supremis adnatis descrescentibus; medialibus usque ad 25 cm. longis et 4 cm. latis, lanceolatis, subfalcatis, apices abrupte vel gradatim acuminatas versus integris vel serrulatis, alibi inciso-lobatis, subcoriaceis, viridibus superne obscurioribus, costa superne sulcata inflexo-setulosa, alibi glabris, lamina pustulosa; lobis ca. 5 mm. longis et latis, vel apices frondis et pinnarum versus brevioribus, ita oblique truncatis ut marginem continuam pinnae praebunt; venatione conspicua, venulis 7–9-paribus quarum utroque ca. 5 anastomosantibus et costulam spuriam apud et infra sinus valde dilatatam efficientibus, aliis apices versus superne

sulcatis vena spuria marginale continua connexis (inde nomen specificum); soris medialibus, magnis, orbicularibus, vulgo 7 inter costam et marginem, ad lobos plerumque carentibus; indusio orbiculari-reniforme, brunneo, medio pilis parvis paucis ornato.

Sumatra, East coast, Deleng Singkoet, north of Berastagi, Karo Plateau. Bartlett, No. 8576, type, U. C. Herb. No. 349090; also No. 6580.

Similar and related to *D. megaphylla, D. truncata,* and probably *D. abrupta.*

Dryopteris excrescens Copel. sp. nov.

Rhizomate repente, 5 mm. crasso; stipitibus approximatis, basibus paleis lanceolatis castaneis ca. 3 mm. longis vestitis, alibi fuscis, minute et decidue pubescentibus, frondium sterilium 30 cm., fertilium 45–50 cm. altis; fronde sterile 30–35 cm. alta, ovata, pinnata, apice pinnatifida, pinnis infimis deflexis vix diminutis, rhachi pallide pubescente; pinnis utroque latere ca. 10, medialibus horizontalibus, stipitulatis, ca. 10 cm. longis, 2.5 cm. latis, acuminatis, basi late truncatis acroscopice subauriculatis, oblique inciso-serratis, herbaceis, superne praecipue prope venas intercalatas iridescentibus, minute setiferis, inferne costa inconspicue setifera, lamina haud pubescente sed sparse et minute pustulosa et glandulis aureis minutissimis et sparsis praedita; lobis vel dentibus obliquis, plerisque obtusis, integris, ca. 5 mm. latis, 2–3 mm. longis; venulis 5–8 paribus, quarum 3–5 paribus anastomosantibus; pinnis frondis fertilis 5–7 cm. longis, 12–15 mm. latis, conformibus, venulis usque ad 5-paribus, omnibus soriferis; soris typice medialibus sed inferioribus valde elongatis etenim totam venulam saepe occupantibus; indusiis castaneis, glabris, persistentibus, parvis, rotundato-reniformibus vel paullo elongatis sed soros elongatos haud omnino tegentibus.

Sumatra, East Coast, near Marbau, Bilah; leg. Rahmat No. 142 (1928), U. C. Herb. No. 355755.

A very well marked species, even without the extraordinary feature of persistent indusia but sporangia spreading far beyond them along the veins. Only the sori near the margin are round and covered. *D. iridescens* v. A. v. R. is evidently similar, most of the apparent differences perhaps due to its having been described from fertile fronds only; but its indusia are said to be densely villous.

Dryopteris Bartlettii Copel. sp. nov.

Plate 58

Nephrodium gregis D. lineatae, rhizomate breve, repente vel suberecto, paleis atrocastaneis lanceolato-ovatis 2–3 mm. latis sparse vestito; stipite fusco-stramineo vel viride-stramineo, prope pedem paleaceo, sursum rhachique dense minute albido-pubescentibus, frondis

sterilis 25–30 cm., fertilis 40 cm. alto; fronde sterile ca. 35 cm. alta, 14–18 cm. lata, pinnata, basi vix angustata, foliola apicale ca. 8 cm. longa lanceolata deorsum leviter pinnatifida; pinnis ca. 12-paribus, infimis deflexis, plerisque recte patentibus, inferioribus brevistipitulatis, infimis basiscopice late cuneatis, plerisque utroque latere tota latetudine recte truncatis vel interdum late subcordatis, rarius acroscopice subhastatis, ca. 2 cm. latis, acutis, inferioribus grosse serratis, supremis integrescentibus, papyraceis, superne cinereo-viridibus et ubique minute setiferis, inferne potius olivaceis ad costas et venas minute pubescentibus ad laminam minutissime aureo-glanduliferis, inconspicue pustulosis; venulis 5–8-paribus (saepius 5) quarum 4–5-paribus anastomosantibus; fronde fertile ca. 30 cm. alta, 7–10 cm. lata, pinnis maximis 5.5 cm. longis, 11 mm. latis; soris medialibus, inter costam et marginem plerumque 4, saepe cum impare, infimis solummodo plerumque elongatis sed vix confluentibus; indusio sat persistente, orbiculari-reniforme, pubescente.

Sumatra, East Coast, between Soenggapa and Pargambiran, Asahan; alt. 270–360 m. Bartlett, No. 6692. February 22, 1927, U. C. Herb., No. 349089.

Well distinguished, in a group rich in species, by its indument, of very fine, persistent, abundant, white bristles, restricted to the upper surface.

Asplenium loxocarpum Copel. sp. nov.

Plate 59

Rhizomate brevi-repente vel suberecto, lignoso, 3 mm. crasso, paleis atrocastaneis nitidis lanceolatis integris 3 mm. longis obtecto; stipite 20–35 cm. alto, fusco, paleis sparsis parvis ornato; fronde 20–35 cm. alta, usque ad 15 cm. lata, lanceolata vel lanceolato-ovata, pinnata, apice serrata, infra apicem pinnatifida et ibidem interdum bulbifera; pinnis brevi-stipitulatis, infimis interdum paullo remotis non vel vix diminutis, inferioribus usque ad 8 cm. longis, falcato-subacuminatis vel rarius rectis, 12 mm. latis, basi obliquis acroscopice truncatis basiscopice anguste cuneatis, margine grosse serratis, viridibus superne obscuris, inferne primo paleis paucis minutis angustis basi interdum ramosis vestitis, mox glabris, tenuiter herbaceis; venis valde remotis, inferioribus furcatis, angulo acuto e costa salientibus; soris remotis, medialibus, nec costae nec margini approximatis, 5–8 mm. longis, plerisque curvatis in parte inferiore suorum costae fere parallelibus; indusio 1 mm. lato, pallide viride.

Sumatra (East coast), Deleng Singkoet, north of Berastagi, Karo Plateau. Bartlett, No. 6605. February 1927, U. C. Herb. No. 349088.

This species combines a venation even more lax than that of *A. persicifolium,* to which the texture and paleae indicate its affinity, with an angle of venation suggesting *A. adiantoides.*

Bartlett, No. 8522, from the slopes of Deleng Baroes, Karoland, is doubtfully referred to the same species. Its fronds are firmer in texture, brownish, and almost all gemmiferous near the base of the pinnatifid apical portion, and the sori are mostly straight.

Tapeinidium Bartlettii Copel. sp. nov.

Plate 60

Rhizomate repente, 5 mm. crasso, paleis rufis angustis apice setaceis 2–3 mm. longis vestito; stipitibus approximatis, fuscostramineis, nudis, ca. 30 cm. altis, ad basin teretis, sursum sulcatis; fronde 50 cm. longa, pinnata, glabra; pinnis alternantibus, pedicellatis, medialibus 13 cm. longis, 10–13 mm. latis, acuminatis, basi anguste cuneatis, leviter et remotissime inciso-serratis vel rarius et solummodo prope basin oblique incisis, herbaceis, in siccitate fuscescentibus; venis angulo acutissimo costa divergentibus, fere rectis, plerisque furcatis, nisi in receptaculo sori liberis; soris submarginalibus, margini et costae parallelis, plerisque 6–8 interdum usque ad 10 mm. longis, soro quoque apicem truncatam dentis lati cujusque occupante, indusio marginem vix attingente.

Sumatra, vicinity of the waterfall Si Saliang, near Pargambirang, Asahan, alt. 360 m.; seen sterile below the waterfall Si Moenoeng-Moenoeng. Bartlett, No. 6731*a*, U. C. Herb., No. 349093.

With more or less equal propriety, this species might be treated as the type of a new genus, or referred to *Tapeinidium*, or construed as a *Sphenomeris*. Its affinity to both of these recognized genera is unmistakable; which brings out a hitherto unsuspected closeness of affinity between the two. In texture and in color, and in the sori occupying the entire apices of the teeth, it agrees with *Sphenomeris;* and the occasional narrow basal teeth or lobes point in the same direction. Paleae several rows of cells wide in the lower part, but of a single row of cells toward the apex, instead of being a single row of cells throughout, are found on robust plants of both genera. As the modification of generic diagnosis, required to make a place for this fern, is less in *Tapeinidium*, where *T. marginale* is already clearly at home, expediency places this species also there. There is ample precedent, in *Lindsaya* and *Nephrolepis*, for examples, for the inclusion in one genus of ferns with the resulting range in form of sorus.

Lindsaya trapezoidea Copel. sp. nov.

Plate 61

Synaphlebium, L. decompositae affine, rhizomate brevi-repente, 1–1.5 mm. crasso, apicem versus paleis minutis angustis ferrugineis vestito; stipite 10–15 cm. alto, sordide stramineo, quadrato; fronde

ca. 20 cm. longa, 4–5 cm. lata, pinnata, in foliolam apicalem linearem basi lobatam desinente, basi non vel vix angustata; pinnis brevipedicellatis, recte patentibus, dimidiatis, oblique trapeziformibus, 5–6 mm. latis, apice oblique acutis, basi acroscopice truncatis et ibidem margine costae parallela, margine acroscopica sparse et levissime incisis vel subintegris, viridibus, papyraceis; venis hic illic anastomosantibus; marginibus acroscopicis et exterioribus soriferis; soris apices prope pinnarum plerumque continuis, rhachin versus interruptis vel saepius carentibus; indusio angusto, cum margine conterminante.

Sumatra, in old jungle near the Aek Kanopan, Loendoet concession, Koealoe. Bartlett, No. 7029. March 1927, U. C. Herb., No. 349087.

Clearly related to *L. decomposita,* from which it is distinguished by the pointed pinna, which, in full fruit, has a sorus continuous from the end of the costa up to and around the point, and part way along the upper margin, with one or a few smaller sori midway on the upper margin, but is usually sterile close to the inner corner.

Davallia impressa Copel. sp. nov.

Rhizomate late scandente, 5 mm. crasso, paleis persistentibus castaneis valde subulatis minutissime horizontaliter ciliatis densissime vestito; stipite castaneo, 40 cm. alto, glabro; fronde 50 cm. longa, late deltoidea, vix quadripinnata, papyracea; pinnis pinnulisque acuminatis; segmentis ultimis oblongis, obtusis, majoribus incisis, minoribus solummodo apices versus dentatis; venis tenuibus, inconspicuis, falsis intercalatis interdum notatis; soris ambabus faciebus frondis aequaliter praestantibus, quam latis vix duplo longioribus, dentibus parvis utroque latere superatis; indusio pallido, basin versus angustato, apice libero rotundato cum margine frondis conterminante.

Sumatra, Poeloe Salah Nama, off the coast of Batoe Bara northeast of Tandjoeng Tiram. Bartlett, No. 6841, U. C. Herb., No. 349311.

Probably related to *D. dissecta;* at any rate like it in many respects, but much less finely cut, and the paleae darker, narrower above the base, and more persistent. The form of the indusium is similar to that figured by Hooker for *D. inaequalis* minor (a form of *Saccoloma moluccanum*). If the species of *Davallia* are grouped as with or without false veins, this one is without them; but a fine line midway between the veins can be detected on either surface in many places.

Lycopodium petiolatum Copel. sp. nov.

Euselago epiphytica pendente, 10–15 cm. longa, pluri-dichotoma; caule deorsum ca. 1 mm., sursum ⅓ mm. crassa; foliis plerumque 6-ordinatis, petiolis 1 mm. longis praeditis; lamina herbacea, integra,

interdum (praecipue deorsum) oblonga 2 mm. longa 1.2 mm. lata apice obtusa vel subacuta basi ad petiolum subdecurrente, interdum (explanata) orbiculare 2 mm. longa et lata, saepius quam lata paullo longiore, lateribus valde retroflexis et sese fere appressis, linea mediale arcuatim inflexa apice foliae caulem appropinquante; sporophyllis zonatis non apicalibus, quam foliis sterilibus confertioribus, evidentius costatis, brevius et latius petiolatis, acutis.

Sumatra, East Coast, Deleng Singkoet, north of Berastagi, Karo Plateau. Bartlett, No. 6575. February 1927, U. S. Herb. No. 349249.

Without similarity or near affinity to any other species known to me.

PLATES 55-61

Cyathea pulchra Copel. Type.

Cyathea paleata Copel. Type.

Dryopteris inclusa Copel. Type

Dryopteris Bartlettii Copel. Type.

Asplenium loxocarpum Copel. Type.

Tapeinidium Bartlettii Copel. Type.

Lindsaya trapezoidea Copel. Type.

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